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CRINOIDS FROM THE CRETACEOUS BEDS OF AUSTRALIA,
WITH DESCRIPTION OF A NEW SPECIES.

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PLATE I.

The Crinoidea are only sparingly represented in beds of Cretaceous Age in Australia. Up to the present time there has been only one species determined, and this only reported from two localities, both of which are in Queensland.⁽¹⁾ The muddy character of the Cretaceous sea in this part of the world appears to have been unfavourable for the development of this class of organisms. It is now my privilege to submit to the Society brief descriptions of three additional examples, including a new species.

PENTACRINIDAE.

Genus ISOCRINUS, Von Meyer.

ISOCRINUS AUSTRALIS (Moore).

Pl. i., figs. 1 and 2.

Pentacrinus australis, Moore, Quart. Journ. Geol. Soc., xxvi., 1870, p. 243, pl. 17, fig. 3; pl. 18, fig. 1.

Pentacrinus australis, Eth. fil., Cat. Austr. Foss., 1878, p. 105.

Pentacrinus australis, Eth. fil., Geol. and Pal. Q'land, etc., 1892, p. 439, pl. 20, figs. 1-3.

Isocrinus australis, Eth. fil., Dept. of Mines, Q'land, Geol. Sur. Bull., No. 13, 1901, p. 6, pl. 1, fig. 4; pl. 3, figs. 1-3.

(1) It is unfortunate that in each instance where the remains have been described no columnals have been present, which is a distinct loss in the way of determination. Moore says, "In a block from Wollumbilla a portion of a column, with 95 regular joints, is present, of probably the same species" (*loc. cit.*). It is to be regretted that these were not figured.

In 1869-70 Charles Moore described and figured a number of fossils that had been collected in Queensland by the Rev. W. B. Clarke, among which were two examples of crinoids contained in calcareous nodules obtained at the Amby River, Mitchell Downs, and which were named by Moore, *Pentacrinus australis*. One of the specimens exhibited the base of the pelvis with the lower portions of three arms and the basal stumps of two others. The other specimen, from the same locality, shows the interior of the pelvis with truncated portions of several arms extending from it.

In 1892, Robert Etheridge, jun., in his "Geology and Palaeontology of Queensland" (p. 439), reproduces Moore's descriptions and plates, but no further examples had, at that date, been found.

Subsequently, the late Mr. George Sweet, of Melbourne, made a valuable collection of Cretaceous fossils in Queensland, which was placed in the hands of Mr. Etheridge for determination, the publication of which forms Bulletin No. 13 of the Geological Survey of Queensland. In Sweet's collection there were two specimens of crinoids which were referred by Etheridge to Moore's species, *P. australis*, but subsequently, following the lead of F. A. Bather (Nat. Science, xii., 1898, p. 245) in his redefinition of the genus *Pentacrinus*, Etheridge placed the Queensland specimens under *Isocrinus*, Von Meyer. The specimens, like those described by Moore, are much crushed and imperfect. Etheridge concludes that *Isocrinus australis* possessed five radials supporting as many rays or arms, and these latter were each divided at a higher level into two, and then, each of these divided arms was again forked at least seven times, or fourteen times to each radial. In no case has a radial arm, or brachium, been found complete, but it is considered that the arms must have been, at least, 8 in. in length.

I have now the pleasure of recording the occurrence of two more examples of this species. The specimens were received by the President (Sir Joseph Verco) from Mr. M. W. Hackendorf, late of Stuart Range, and were obtained from the precious opal deposits of that locality. The specimens form pseudomorphs in precious opal, but are coated with a thin superficial layer of a ferruginous kind which obscures the opaline structure. As the specimens are more or less covered by small circular-shaped lichens, they must have formed surface stones on the outcrops. The two specimens are of about equal size and character and consist of portions of brachia, or arms, which have been broken off at the radials near their basal connection, with the respective calices

or cups. The length of the larger example extends to only $1\frac{1}{2}$ in., and the other is a trifle smaller. There are the remains of five arms in each specimen, consisting of the lower portions, and the longest fragment shows twelve brachial plates, or ossicles. The arms are three-tenths of an inch in diameter, uniserial, and nearly circular in transverse section. There is no bifurcation present, as the arm-fragments are too short to show forking. The several features of the specimens from Stuart Range, so far as shown, are in all respects similar to those of *Isocrinus australis*, and I have no doubt that they belong to that species.

ISOCRINUS PARVUS, n. sp.

Pl. i., fig. 3.

In 1909 Mr. A. S. Giles forwarded to the Adelaide Museum a small piece of limestone, of Cretaceous Age, containing crinoidal remains, and stated that the specimen had been obtained from a locality 20 miles north of Macumba Creek. The specimen was courteously placed in my hands for examination. The fragmentary condition of the remains did not offer much encouragement in the way of description, so that the specimen has remained undescribed until the present. The discovery of two additional examples of *Isocrinus australis*, described above, made it desirable that, in recording their occurrence, some notice should be taken, at the same time, of the examples obtained near Macumba Creek.

The crinoidal remains obtained from the last-named locality are included in a piece of shelly limestone, of flattened shape, $2\frac{1}{2}$ in. in diameter; the fossils, which are of a fragmentary character, are exposed on both the flat faces, as well as the edges, of the stone. The remains are limited to brachia and pinnules, affording only scanty data for specific determination; but the rarity of fossils of this type in the Cretaceous beds of Australia and its manifest distinction from the hitherto only known Australian species of this age, may be assigned as sufficient reasons for the present restricted and imperfect diagnosis.

Def.—Stalk and cup unknown. Arms bifurcate equally (isotomous). Brachial plates, uniserial; rectangular in vertical figure and suboval in transverse outline; destitute of striae; with ambulacral groove on ventral side; minutely perforated, centrally. Pinnules numerous. Distinguished from *I. australis* by its greatly inferior size.

As previously stated, the remains are restricted to brachia and pinnules. These are represented by 21 fragments, probably representing more than one individual,

especially as some of the fragments lie in reversed positions to each other. The arm-fragments are imperfect at each extremity, so that it is impossible to define the position which they severally occupied in the crown. The largest example, present, has a length of 2 in. The lower portion of this fragment consists of five ossicles, each deeply niched at half distance. An axial joint marks the beginning of bifurcation (the only one seen on the slab), beyond which the brachial ossicles are somewhat reduced in size, but are equal to each other in the respective branches, and destitute of the divisional niche seen in the plates below the point of bifurcation. There are 28 brachials in one branch and 35 in the other—neither are complete.

In the case of the lower limb (below bifurcation) the ossicles measure one-tenth of an inch in diameter, but those in the limbs above the axial joint gradually taper to a fourth of the original size. This would lead us to infer that the specimen shows the last fork in the arm and the respective rays, thus formed, would be finials. All the arm-fragments seen on the stone are closely pinnulated, and the latter extend along the entire length of those exposed.

The specimen agrees with the genus *Isocrinus* in the characteristic feature of its isotomous bifurcation, but is distinguishable from *Isocrinus australis* by its relatively small size. The type specimen has been placed in the National Museum, Adelaide.

DESCRIPTION OF PLATE I.

(All objects of natural size.)

Figs 1 and 2. *Isocrinus australis* (Moore). Pseudomorphs in precious opal. The light-coloured portions show the opaline interior where the surface "skin" has been removed by abrasion. The darker portions represent the ferruginous coating of the specimens.

Fig. 3. *Isocrinus parvus*, n. sp. Brachia, probably finials, showing pinnules and isotomous bifurcation.
